



Equipment Engineering and Quality Assurance Technical Specification

Specification:
EE&QA-886

OCS Inspection Car Consist Procurement

Appendix B: Definitions, Abbreviations, Acronyms, and Trademarks

Page: -

Date: November 1, 2019

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Appendix B

Definitions, Abbreviations, Acronyms, and Trademarks



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1 DEFINITIONS AND ABBREVIATIONS

Wherever in these Technical Specifications the following terms and abbreviations are used, the intent and meaning shall be interpreted as follows:

1.1 Definitions

Acceptance: (As applied to a vehicle or other physical asset): The transfer of ownership of a vehicle or other physical asset from the Contractor to the MBTA.

Acceptance: (As applied to design information, technical documentation or similar intellectual property): Reviewed for conformity to Specification and accepted, in writing, by the MBTA. See Technical Specification Section 17 for additional information regarding the MBTA's disposition of submitted information.

Accepted Equal: Whenever the words "accepted equal" or "equal" are used in connection with material or equipment in these Contract Documents including the Specifications, the proposed alternative shall be functionally compatible with and of equal or better quality than the item it proposed to replace.

Addendum/Addenda: Written interpretation(s) or revision(s) of any of the Contract Documents sent to Offerors prior to submittal of proposals.

Advertisement: The invitation to offer a proposal for work to be performed or materials to be furnished.

Alteration: A change or substitution in the form, character, or detail of the work done or to be done within the original scope of the Contract.

Ancillary Equipment: Equipment that is used to assist with maintenance personnel in completing their tasks.

Anti-Climber: Fingers at the ends of cars that are designed to engage adjacent cars (when the units are subjected to large buff loads) to prevent climbing and subsequent telescoping of one car into another.

Approval: Review and acceptance in writing by the MBTA. See Technical Specification Section 17 for additional information regarding the MBTA's disposition of submitted information.

Approved Equal: See Accepted Equal.

Approved Or Approved Type: Design, type of material, procedure, or method given approval by the MBTA.

Audible Resonance: The amplifying of sound waves whose frequency matches one of its own natural frequencies of vibration (its resonance frequencies).

Authority: The MBTA.

Authorized Signee: The person who is executing the Contract on behalf of the Offeror/Contractor and who is authorized to bind the Offeror/Contractor.



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Automatic Coupler: A coupler which when mechanically engaged also engages electrical and pneumatic trainlines between cars.

Base or Baseline Design: The design of the car or any of its components, apparatus, systems, sub-systems, or materials which has received both design review approval and first article approval by the MBTA.

Benchmarking: The recalculation of compensation adjustments on account of changes in labor and/or material cost utilizing indices as set forth under the provisions of the Contract Documents subsequent to the establishment of final published indices during the performance of this Contract or subsequent to the month(s) for which the option for additional vehicles is executed shall not be allowed.

Bid Form: See Proposal Form.

Bidder(s): See Offeror(s).

Blending: In braking, a simultaneous dynamic and friction brake application, with the effort of each continuously proportioned to achieve the required total braking effort.

Broad Band Emissions: These emissions pertaining to wide bandwidth data transmission that are in the range of Mega Hertz (MHz). Cellular systems and TV channels may operate in the range from 1.25 MHz to 20 MHz. Wifi systems operate in the 40 MHz range. There are also WiFi systems that operate in the Giga Hertz range from 2.5 Ghz to 5 Ghz.

Buyer(s): The Massachusetts Bay Transportation Authority.

Calculations: Numerical computations performed to demonstrate compliance with the Specifications, technically substantiate a design or position or otherwise show due technical diligence.

Car: A complete vehicle, ready to operate.

Carborne: Equipment that is located onboard the vehicle.

Case-by-Case: Considering or dealing with each instance separately, taking into account its individual circumstances and features.

Car History Book: The vehicle or car's record book from manufacturing to final acceptance. See Technical Specification Section 16.

Carhouse: A facility where maintenance can be performed on the rail vehicles.

Change Order (See Contract Documents): A Contract Document executed by the MBTA and issued to the Contractor amending the Contract Provisions and/or Specifications. The change order establishes the basis for payment and time adjustments, if any, of the work affected by the changes. The Document becomes a part of the Contract when executed by the Contractor and the Massachusetts Bay Transportation Authority. All terms and conditions of the Contract Documents including the Specification remain as previously stated unless so noted in the text of the change order.



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Coast: The mode of operation of a car or train in which propulsion (positive traction) and brake (negative traction) are inactive and the apparent braking effort results only from the train's rolling resistance and aerodynamic drag.

Comment: The MBTA's written critiques of the Contractor's submittals to the MBTA.

Commonwealth Of Massachusetts: State of Massachusetts.

Concept Drawings/Plans: An initial set of drawings showing the general car layout and arrangement provided by the Contractor with their proposal.

Conditional Acceptance: See Contract Documents.

Consultant Or Consulting Engineer: The engineering design consultant (firm) retained by the MBTA to assist the MBTA's Engineer and Project Managers in the preparation of Plans and Specifications, proposal evaluation, review of Contractor submittals, inspection and testing, and other tasks associated with this Procurement.

Contract Amendment: See "Change Order".

Contract Documents: Refer to the Request for Proposal and actual Contract Documents.

Contract Drawings: Drawings provided by the MBTA as part of the Contract Documents or Technical Specifications.

Contract Time: The number of days allowed for completion of the Contract.

Contract: The written agreement executed between the MBTA, Party of the First Part, and the Contractor, Party of the Second Part, setting forth the obligations of the Parties thereunder, the performance of the procurement as indicated in the Proposal Documents and all authorized changes to this Contract issued subsequent to the execution of the Contract.

Contracting Officer: Executive Director of the MBTA, or designated representative, responsible for executing the Contract and all Change Orders on behalf of the MBTA.

Contracting Officer's Technical Representative: A designated representative of the MBTA, responsible for technical issues on behalf of the MBTA.

Contractor: The Prime Contractor solely responsible to the MBTA for the quality and proper functioning of the vehicle(s) and all components; the person or persons, firm, partnership, corporation, or combination thereof which has entered into this Contract with the MBTA to supply the vehicle(s).

Contractor's Drawings: Items such as general arrangement drawings, detail drawings, engineering specifications, purchasing documents, graphs, diagrams, and sketches which are prepared by the Contractor to detail and define its work.

Days: Unless otherwise designated, days as used in the Contract Documents will be understood to mean calendar days.

Days, Working: Those calendar days during which regular business is conducted, excluding Saturdays and Sundays and all MBTA-observed Federal, State, and municipal holidays.



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Deadman: A fail-safe feature designed to activate an emergency application in the event a human operator becomes incapacitated.

Deaeration: The process of removing dissolved gases from liquid.

Dead Towing: The process of towing a vehicle when the vehicle loses its propulsion.

Decking: Materials used on exterior areas of the car, over the sub-floor structure, to provide a walking surface for personnel or a surface on which to store materials.

Defect: Patent or latent malfunction or failure in manufacture or design of any component or subsystem that causes a vehicle to cease operating, causes it to operate in a degraded mode or causes it to operate contrary to the documented design.

Delivery: Refer to the Contract Documents.

Delivery Point: The location on the MBTA's property to which the end products are expected to be delivered. For purposes of this Contract, the tentative delivery point(s), subject to change, will be:

Blue Line - Orient Heights Carhouse
26 Barnes Avenue
East Boston, MA 02128

Green Line – Riverside Carhouse
331 Grove St.
Newton, MA 02462

Designated Representative: A person who is an employee of the transit Authority, Authority contracted consultant, or an advocate who is an extension of the transit Authority that has the authorization to exercise their power in making decisions that are in the best interest of the transit Authority.

De-Trucking: The process of disconnecting the truck assembly, that includes parts such as the bolster, brake and propulsion system, primary suspension, truck frame, wheels and axles, from the rail vehicle.

Device: Any component included in a system or subsystem, whether electrical, mechanical, or hydraulic.

Disapproved: Refer to Technical Specification Section 16.4.7.3.3.

Director Of Materials/Director Of Materials Management: Director of Materials Management for the Massachusetts Bay Transportation Authority, an official designated by the MBTA to administer Contracts and make related determinations and findings such as executing Contracts and Change Orders.

Drive: A system consisting of one or several motors, their direct control equipment (power circuits) and the associated mechanical devices required to produce a useful output.

Elastomer: Based on polymers which have the property of elasticity.

Empty Weight: Vehicle weight in ready run condition with no cargo.



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End Product: The Contract item(s) to be purchased by the MBTA in accordance with the Contract Documents. End Product(s) includes, but is not limited to, vehicles, special tooling, PTEs, drawings, specifications, instructions, books, education programs, spare parts and/or services.

Engineer: For this procurement, the "Engineer" shall be embodied in the MBTA's Technical Project Manager or by his designee.

Environmental Stress Screening: The process of exposing a newly manufactured or repaired product or component (typically electronic) to stresses such as thermal cycling and vibration in order to force latent defects to manifest themselves by failure during the screening process. The surviving population, upon completion of screening, can be assumed to have a higher reliability than a similar unscreened population.

Equal: See "Accepted Equal".

Excessive Wear: Wear that is beyond what is typical or normal that reduces the life cycle of the equipment.

Fail-Safe: A characteristic of a system which insures that any malfunction affecting safety will cause the system to revert to a state that will cause no or minimal harm to other equipment, the environment or to people.

Failure: An improper condition which will require the vehicle to be withheld from or removed from scheduled operation for corrective action.

Failure Rate: The frequency of failure, expressed as failures per hour or failures per mile. Failure rate is the mathematical reciprocal of MTBF or MDBF.

Final Acceptance of Vehicles: When all corrective actions and retrofit (if any) have been fully completed, and the vehicle is considered by the MBTA to be fully compliant with the Contract.

Final Assembly: Installation and interconnections of propulsion control equipment, propulsion cooling equipment, brake equipment, energy sources for auxiliaries and controls, heating and air conditioning, communications equipment, motors, wheels and axles, suspensions and frames; the inspection and verification of all installation and interconnection work; and the testing in plant of the stationary product to verify all functions.

First Article: The first one of any production component of the car that is produced. The specification requires that nothing be manufactured prior to approval, so the First Article shall have been made to approved drawings.

First Article Acceptance: The examination and approval by the MBTA of an initial part, major assembly, subassembly, system, subsystem, apparatus, or material, manufactured or assembled by either the Contractor or Subcontractors. The First Article Approval establishes the baseline design and the minimum level of quality. Although the exercise of First Article Approval shall be at the MBTA's option, the contractor shall assume that the MBTA will subject all of the above to first article examination and approval.

First Article Inspection (FAI): An extraordinary inspection of a First Article which accomplishes two purposes. First, it permits the MBTA to see, in three dimensions, what could be seen only on two dimensional drawings up to that point. If the First Article Inspection is of a component that the Contractor is purchasing, rather than making itself, the First Article Inspection discloses details that



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were not visible beforehand. The First Article Inspection is usually the first point at which maintainability of the component can be evaluated, in as much as it is the first point at which relationships between elements can be appreciated. The MBTA may approve the design that is revealed at the First Article Inspection, or may require changes in order that the component can meet the requirements of the Contract. Second, it is used to establish the quality level of workmanship that will be maintained for the balance of the components. The level is established jointly by the MBTA and the Contractor.

Fully Loaded: Same as Maximum Gross Weight.

Glove Work: Work that requires the use of insulated gloves.

Heavy Maintenance: Vehicle Maintenance that requires the removal of equipment from the vehicle for an extended period of time.

Heavy Rail: A mode of transit that has the capacity to handle heavy volumes of passengers.

Horn, Pantograph: The horn is the geometric shape that gives the contact shoe its name that is in the shape of a horn. The contact shoe/horn is connected to the pantograph.

Hunting: Undesired truck oscillation above the equilibrium position.

Hydrostatic Transmission: A pump, connected to the prime mover, generates flow to drive a hydraulic motor, which is connected to the load.

Independent Failure: A failure which is not the result of another failure, either directly or indirectly.

Indicated: Shall be understood to mean, "as required in the Contract Documents, or as described in the Specifications."

Information: This disposition is provided for submittals presented to explain an "approved equal" submittal, a concept and/or an approach to the Work, and appropriate conditions. The Contractor must not proceed with the Work addressed in such submittals until the concept has been finalized and "Approved."

In-Process Inspection: Scheduled or unscheduled inspection of parts, components, manufacturing facilities or manufacturing processes at any time during the production process. May be utilized to verify efficacy of processes and quality of parts prior to reaching completion. Also, refer to Technical Specification Section 15 for "MBTA Product and Process Audit".

Inspector: A person or firm designated by the MBTA as its quality assurance representative. The Inspector's authority is derived through the MBTA Technical Project Manager.

Interface: The points where two or more systems, subsystems or structures meet, transfer energy, or transfer information.

Irretrievable Brake Application: A brake application that results in an impossible recovery of the vehicle controls. Vehicle controls can only be recovered after the vehicle has come to a complete stop (zero speed).

Jerk Rate: Time rate of change of acceleration and deceleration, equal to the second time derivative of velocity.



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Jumper: A short piece of wire or cable with appropriate terminations on each end to permit connection to terminals within a terminal board or to an adjacent terminal strip.

Layover: A period of time that is used for equipment and personnel to recover.

Line Replaceable Unit: Components that are replaceable on the vehicle.

Live Loads: A load that moves relative to the structure under consideration.

Major Equipment: Components, sub-assemblies, assemblies and ancillary equipment that together comprise a vehicle system that is a section title in the Technical Specification.

Manufacturer: An original builder or producer supplying materials, components, devices, equipment, or apparatus for installation on the car.

Material (Supplies): Any substances specified for use in the construction and/or manufacture of the Procurement End Products(s), or to be furnished to the MBTA as loose items as part of the Procurement.

Material Review Board (MRB): A Material Review Board is a group of appropriately qualified individuals gathered to review and dispose of material or workmanship found to be non-conforming to the requirements of the Contract or the Contractor's drawings.

Maximum Gross Weight: The maximum operating weight of the vehicle plus allowable load.

MBTA: The Massachusetts Bay Transportation Authority, created by Chapter 563, Section 18 of the Acts of 1964 of the Commonwealth of Massachusetts, the Party of the First Part to the Contract.

Motor Person: Personnel that drives the vehicle and does not operate work equipment.

Narrow Band Emissions: These emissions pertain to bandwidths that radio signals and communication networks, such as Ethernet or packet radio operate in. Radio signals operate in the frequency range from 6.25 kHz to 12.5 kHz. Communication network signals operate in the throughput rate (maximum rate of production) from 10 kbps to 20kbps.

Notice: A written announcement.

Normal Maintenance: Maintenance that is expected during the service life of the equipment that is routine.

O-Ring: A mechanical gasket that is in the shape of a torus that is designed to be seated in a groove and compressed during assembly between two or more parts, creating a seal at the interface.

Occupied Volume: A volume of a vehicle that is normally occupied by crew members such as the operator station and crew cabin.

Offeror: Any individual, firm, partnership, corporation or joint venture submitting a Proposal on the Form for Proposal provided, for the work contemplated, acting directly or through a duly authorized representative.

On-Board: Available or situated on the vehicle.



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Operator: Personnel that operates any vehicle equipment, including the motor person.

Operator Station: A station where the operator has controls to operate and drive the vehicle.

Operating Time: Time that the vehicle is turned on, with primary and/or auxiliary systems functional.

Organizational Chart: A graphic representation of the structure of an organization, showing the relationship of the positions of jobs within it.

Original Equipment Manufacturer(s): The original manufacturer of the vehicles and all principal subcomponents.

Owner Or Purchaser: The MBTA.

Party, Parties: Entity(ies) entering into the Contract.

Plans: The MBTA's drawings (if included) as prepared by the MBTA, which supplement the Specifications and are a part of the Contract Documents; also called Contract Drawings.

Pre-Shipment Inspection: Source Inspection of vehicles, product, parts, components subsystems and/or systems conducted immediately prior to releasing items for shipment to Contractor or other destination.

Proceed: Refer to Technical Specification Section 16.4.7.3.1.

Proceed Pending: Refer to Technical Specification Section 16.4.7.3.2.

Procurement (Work): The furnishing of all equipment, items, materials, parts, systems, data, design, services, incidentals, labor and management and performance of the contractual requirements defined in the Contract Documents, including changes thereto, in order to produce and deliver the specified Cars, spare parts, tooling, software goods, and services.

Program: The total effort undertaken by the MBTA of which the End Products may constitute a whole or a part.

Project Manager For Administration: The person designated by the MBTA as its representative in matters pertaining to administrative aspects of the Contract such as pricing, payments, liquidated damages, change orders, etc.

Project Manager For Engineering: See "Technical Project Manager".

Proof (Used As A Suffix): Apparatus is designated as splashproof, dustproof, etc., when so constructed, protected, or treated that its successful operation is not interfered with when subjected to the specified material or condition.

Proposal Form: The approved form on which the MBTA requires proposals to be prepared and submitted for the work, and which is part of the Proposal heretofore defined. When executed by the Offeror, the proposal becomes the Contractor's written offer to perform the work and furnish and deliver the equipment/materials at the prices quoted.

Proposal: The Offer in response to the MBTA's Request for Proposal, including the Contract Documents with Specifications, to be submitted in the prescribed manner, properly signed and



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certified using the forms provided by the MBTA as required and all data to be supplied by the Offeror to be in conformance with said Documents.

Qualify: As used in these Specifications shall be the determination that an assembly, sub-assembly, or any part thereof is satisfactory for continued service under the Contractor's warranty, or that the time is suitable for repair or overhaul to restore it to warrantable service, or that the item must be replaced with a new (or warrantable rebuilt) part.

Ready to Run: Vehicle is fully operational including all equipment, fluids, etc.

Receipt, Received: Acknowledgement that a shipment has reached its destination.

Related Defect: Damage inflicted on any component or subsystem as a direct result of a defect.

Reliability: The probability of performing a specified function without failure and within design parameters for the period of time specified under actual operating conditions.

Representative: Shall mean any duly authorized agent of the MBTA or the Contractor.

Retrofit: A modification performed after Conditional Acceptance.

Restrictive: The potential system response which results in a more safe condition (i.e. stop vs. proceed, lower speed vs. higher speed, deceleration vs. acceleration, etc.)

Review and Approval: An MBTA work process that performs a review of Contractor supplied documentation to ensure that it complies with the specification requirements or is an acceptable alternate or deviation. If the documentation is compliant and adequate the documentation will ultimately be approved or provided a proceed designation by the MBTA.

Right of Way: The transit authorities' private property that is exclusively used for rail transit. This includes the Commuter rail, Heavy rail (Red Line, Orange Line, and Blue Line), and Light rail (Green Line).

Safe: The condition in which personnel are secure from threat or danger, harm, or loss arising from improper design, manufacture, assembly, malfunction, or failure of the car or any of its components or systems.

Section: Section refers to the indicated Section of the Contract Documents and Specifications plus all subsections thereof (unless the context indicates otherwise).

Service Proven or Proven: A product or design to be implemented with systems or components that have demonstrated successful operation in a similar transit or railroad environment or that are evolved from such service proven designs. Refer to Technical Specification Section 2.

Service (as in Service Use, Service Braking, Revenue Service): The operation of the cars under normal conditions.

Shear Loading: A force that causes shear stress, a type of mechanical failure, when applied to a structural element. It is created when two planes of the same object are trying to slide past one another.



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Shipment: The physical process of transporting a vehicle and associated components, or other required physical deliverable item, from the point of manufacture or assembly to the next manufacturing or assembly facility or to MBTA property.

Shop Drawings: Drawings or sketches prepared by the Contractor for use in its manufacturing facility, assembly facility, or shop, to fabricate, assemble, and/or install parts of the vehicle, whether manufactured by it from raw materials or purchased from others in a ready-to-use condition.

Slide, Wheel: During braking, the condition existing when the rotational speed of the wheel is less than that for pure rolling contact between tread and rail.

Source Inspection: Inspection conducted at the source of the product (generally Subcontractor/Supplier). May include FAI, Process Inspection, Pre-shipment Inspection or may be performed as part of an investigation to gather data used to locate the source of the problems revealed later in the vehicle production process, testing or in service / operation.

Special Tools: Tools required to perform inspection, maintenance, or overhaul work that are not readily available from a recognized supplier of consumer tools.

Speed, Balancing: The steady-state speed attained by a vehicle or train when resisting forces exactly equal the maximum available tractive forces on level tangent track.

Speed, Maximum Operating: MBTA-defined maximum allowable speed for the vehicle. Above this speed, the vehicle shall automatically go into coast mode.

Speed, Maximum Safe: The maximum speed at which the vehicle is designed to operate without causing damage to equipment.

Spin, Wheel: During acceleration, the condition existing when the rotational speed of the wheel is greater than that for pure rolling contact between tread and rail.

Stop, Emergency: The stopping of a vehicle or train by an emergency brake application.

Stop, Service (Full): The stopping of a vehicle or train by application of service braking. Brake application can be released and reapplied.

Subcontractor: An individual, firm, partnership, corporation, or joint venture to whom the Contractor sublets any part, subsystem, component or hardware for the Contract.

Supplier: The persons, firm, or corporations who furnish materials/services to the Contractor. Supplier furnished materials/services shall comply with all the contract requirements. Note: During the course of this contract, the MBTA may interchangeably use the word subcontractor, supplier, subsupplier or vendor as synonyms, all the aforementioned being under contract to the Contractor.

Technical Project Manager: Person designated by the MBTA to be its liaison with the Contractor on all technical matters pertaining to the work. The Technical Project Manager is empowered to act on behalf of the MBTA in such matters as approval/proceeds of Contractor's drawings, test procedures, First Articles, and Car acceptance.

Technical Specifications, Specifications: Shall mean Specification No. EE&QA-886 for the Green and Blue Line OCS Car Consists, and any appendices, change orders or addenda made pursuant to the Contract Documents.



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Telltale Holes: Inspection practice used to provide a leakage path from an area that is not normally visible to an area that can be inspected caused by uniform internal corrosion that exceeds a certain amount. It gives an indication rather than progressing on to a possible catastrophe.

Tier 4: Tier 4 refers to a generation of federal air emissions standard established by the U.S. Environmental Protection Agency (EPA) that apply new diesel engines used in off-road equipment. It requires manufacturers to reduce the levels of particulate matter and oxides of nitrogen (NOx) to a level that is 50-96% lower than existing generation of diesel engines. This is applicable to new products and does not apply to diesel engines of previous generations.

Tight (Used As A Suffix): Apparatus is designated as watertight, dust-tight, etc., when so constructed that the enclosing case will exclude the specified material.

Time Constant: Time interval from the beginning of change of a controlled variable in response to a step-forcing function to the attainment of a stated value.

Time, Down: The lapsed time during which equipment is not capable of doing useful work because of maladjustment, malfunction, or maintenance in progress.

Traction System: The system of wheels, motors, driving mechanisms, brakes, direct controls and appurtenances that propels or retards a car in response to control signals.

Tram: A condition of ideal truck geometry in which the axles are perfectly parallel and the wheels longitudinally in perfect alignment. The centers of the journal bearings represent the corners of a perfect rectangle. Tram is checked by measuring the diagonal and longitudinal distances between reference points on the axle bearing housing.

Trip Cocks: Pneumatic or electric device that acts as part of the friction brake system and is located on the trucks of a rail vehicle. The Trip Cocks, when activated by the wayside Trip Stops activate the emergency brake system, bringing the vehicle to a full stop.

Trucking: The process of connecting the truck assembly that includes parts such as the bolster, brake system, primary suspension, truck frame, wheels and axles, to the rail vehicle.

Ultimate Capacity: The ultimate capacity of a structural member is defined as the condition where the structural member cannot support an increased load.

U.S. Department Of Transportation: U.S. Department of Transportation (DOT) means the Secretary of the DOT and other persons who may at the time be acting in the capacity of the Secretary, or authorized representative or any person otherwise authorized to perform the functions to be performed hereunder, including representatives of the Federal Transit Administration (FTA).

Vehicle: Same as "Car".

Vendor: See "Supplier".

Vital Circuit: Any circuit and its elements, the function of which affects the safety of train operations.

Warp, Track: The vertical distance between the plane of any three of four rail head contact points (two on each rail) forming a plane and the remaining point.



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Weight, Actual: The measured weight of a finished empty car, ready for service, and with all fluid levels filled to the top.

Work (Procurement): Where the context will allow, the term "work" means the production of goods and services furnished in accordance with the Contract.

Yard: An area of track that is located off of the Mainline or at a Carhouse where trains can be stored.

1.1.1 Abbreviations

- 1.1.1.1 The following is a list of abbreviations used in the Technical Specification and Appendix. The list is not intended to be all inclusive.

AAR	Association of American Railroads
AC	Alternating Current
ANSI	American National Standards Institute
ANSYS	Analysis Systems
APS	Auxiliary Power Supply
APTA	American Public Transportation Association
AREA	American Railway Engineering Association
ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers
ASI	Automatic Station Identification
ASM	American Society for Metals
ASME	American Society of Mechanical Engineers
ASQ	American Society for Quality
ASTM	American Society for Testing and Materials
AVI	Automatic Vehicle Identification
AWG	American Wire Gauge
AWS	American Welding Society
BHP	Brake Horsepower
BNC	Baby "N" Connector
BTE	Bench Test Equipment
Btu	British Thermal Unit
°C	Degrees Centigrade
C	Capacitance
CAD	Computer Aided Design
CCTV	Closed Circuit Television
CDRL	Contract Deliverable
cfm	Cubic Feet Per Minute
CFR	Code of Federal Regulations
CMR	Code of Massachusetts Regulations
COTS	Commercial off the Shelf
DEF	Diesel Exhaust Fluid
DOT	United States Department of Transportation
dB	Decibel
dBA	Decibel, A Scale Reading
DB	Dry Bulb
DC	Direct Current
DPU	Department of Public Utilities, Massachusetts
DVD	Digital Video/Versatile Disc



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DVR	Digital Video Recorder
ECR	Engineering Change Request
ECU	Electronic Control Unit
EMI	Electromagnetic Interference
EMC	Electromagnetic Compatibility
EMCP	Electromagnetic Compatibility Plan
EPA	Environmental Protection Agency
°F	Degrees Fahrenheit
FDB	Degrees Fahrenheit Dry Bulb
FWB	Degrees Fahrenheit Wet Bulb
FAI	First Article Inspection
FDR	Final Design Review
FDW	Degrees Fahrenheit Wet Bulb
FE	Finite Element
FEA	Finite Element Analysis
FMECA	Failure Modes and Effects and Criticality Analysis
fpm	Feet Per Minute
FRA	Federal Railroad Administration
FRP	Fiberglass Reinforced Plastic
FST	Flame, Smoke, and Toxicity
FTA	Federal Transit Administration
FTA	Fault Tree Analysis
Ft	Feet
G	Gravitational acceleration on Earth (9.81 mpsps)
GPS	Global Positioning System
GLTP	Green Line Train Protection
HAZ	Heat Affected Zone
HDD	Hard Disk Drives
HP	Horsepower
HSCB	High Speed Circuit Breaker
HSLA	High Strength Low Alloy (Steel)
HVAC	Heating, Ventilation, and Air Conditioning
Hz	Hertz
I/O	Input/Output
IDR	Intermediate Design Review
IEC	International Electrotechnical Committee
IEEE	Institute of Electrical and Electronic Engineers
IES	Illuminating Engineering Society
IP	Ingress Protection
ISO	International Standards Organization
kHz	KiloHertz
kV	KiloVolts
LAHT	Low Alloy High Tensile Strength (Steel) (same as HSLA)
lbs	Pounds
lbf	Pounds force
LED	Light Emitting Diode
LRU	Line Replaceable Unit
LLRU	Lowest Level Replaceable Unit
LFC	Low Floor Car
LVPS	Low Voltage dc Power Supply



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Appendix B – Definitions, Abbreviations, Acronyms, and Trademarks

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L/V	Lateral / Vertical
mA	Milliamp
MBTA	Massachusetts Bay Transportation Authority
MDS	Monitoring and Diagnostics System
MHz	Megahertz
MIL-STD	Military Standard
MOW	Maintenance of Way
mph	Miles Per Hour
MPS	Master Program Schedule
mphps	Miles Per Hour Per Second
mphpsps	Miles Per Hour Per Second Per Second
MRB	Material Review Board
ms	Millisecond
MTBF	Mean Time Between Failure
μA	Micro Ampere
NASTRAN	NASA Structure Analysis
N/A	Not Applicable
NEC	National Electrical Code
NEMA	National Electrical Manufacturers' Association
NFL	No Field Lubrication
NFPA	National Fire Protection Association
NiCd	Nickel Cadmium
NTP	Notice to Proceed
OCS	Overhead Contact System
OHA	Operating Hazard Analysis
OSHA	Occupational Safety and Health Administration
PA	Public Announcement
PC	Printed Circuit
PDR	Preliminary Design Review
PHA	Preliminary Hazard Analysis
PLC	Programmable Logic Controller
PMP	Program Management Plan
ppm	Parts Per Million
PQAP	Project Quality Assurance Plan
psi	Pounds Per Square Inch
psia	Pounds Per Square Inch, Absolute
psig	Pounds Per Square Inch, Gauge
PTC	Positive Train Control
PTE	Portable Test Equipment
PTT	Push-to-Talk
PTU	Portable Test Unit or equipment
QA	Quality Assurance
RAM	Random Access Memory
RF	Radio Frequency
RFI	Radio Frequency Interference
RFID	Radio Frequency Identification
RH	Relative Humidity
rms	Root Mean Square
rpm	Revolutions Per Minute
ROM	Read-Only Memory



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ROW	Right of Way
SAE	Society of Automotive Engineers
SATP	Stress Analysis Test Plan
SCR	Silicone Controlled Rectifier
SDD	Software Design Description
SFD	System Functional Description
SPL	Sound Pressure Level
SRS	Software Requirement Specification
SSHA	Subsystem Hazard Analysis
SSPP	System Safety Program Plan
TBD	To be determined
TOR	Top-of-Rail
UL	Underwriters Laboratories Inc.
ULSD	Ultra-Low Sulfur Diesel
USASI	United States of America Standards Institute
USDOT	United States Department of Transportation
UV	Ultraviolet
VAC	Volts, Alternating Current
VDC	Volts, Direct Current
W	Watt
WB	Wet Bulb

1.2 STANDARDS, CODES, AND SPECIFICATIONS

- 1.2.1 This Specification references various standards and codes pertaining to industrial, commercial, military, and government applications.
- 1.2.2 Standards that do not specify a date or latest revision, the most current standard shall be used at the time when the Contract has been given a Notice to Proceed (NTP).
- 1.2.3 The date or revision is an integral part of the standard name or number. In these cases, the cited standard is the version that was in effect at the time of Specification preparation.
- 1.2.4 The syntax "later revisions exist" indicates that a referenced standard or code is superseded by the date or latest revision of that standard or code.
- 1.2.5 Standards with the status of "cancelled", "obsolete", "not supported", or have not been superseded or replaced by a current standard are cited. The "cancelled" or "obsolete" status of such standards does not invalidate the technical content of these standards, and such standards are intentionally cited.

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